

General Algebra 2 Worksheet #4 Unit 9 Selected Solutions

A canon ball is fired upward from the top of a tall building, 300 feet above the ground. The function $h(t) = -16t^2 + 160t + 300$ gives the height of the ball above the ground, in feet, t seconds after it was fired.

1. What is the maximum height reached by the ball? How long did it take the ball to reach its maximum height?

Find the vertex. There are two common methods for finding the vertex.

At the vertex, $t = -B/2A$

$$t = -160/-32 = 5$$

The maximum value of h is

$$h(5) = -16(5)^2 + 160(5) + 300$$

$$h(5) = 700$$

$$h = -16t^2 + 160t + 300$$

$$h - 300 = -16(t^2 - 10t)$$

$$h - 300 - 400 = -16(t^2 - 10t + 25)$$

$$h - 700 = -16(t - 5)^2$$

The vertex is (5, 700).

The maximum height is 700 feet.

It will take 5 seconds to reach that height.

5. When will the ball hit the ground?

Find t when $h = 0$

$$h = -16t^2 + 160t + 300$$

$$0 = -16t^2 + 160t + 300$$

$$0 = 4t^2 - 40t - 75$$

$$t = \frac{40 \pm \sqrt{2800}}{8}$$

$$t \approx 11.6 \text{ or } t \approx -1.6$$

It will hit the ground in about 11.6 seconds.